A New Leptodactylid Frog from the Cordillera Oriental of Colombia

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ABSTRACT. *Eleutherodactylus anolirex* is named from the northern Cordillera Oriental of Colombia (2,830–3,400 m). This species was previously confused with *E. supernatis* and *E. vertebralis*. It is most closely related to *E. devillei*, *E. supernatis*, and *E. vertebralis*, species of the western Andean cordilleras of Colombia and Ecuador.

INTRODUCTION

Although Cochran and Goin (1970) reported the leptodactylid frog from *Eleutherodactylus vertebralis* (Boulenger) to be widely distributed in Andean Colombia, Lynch (1980) showed *E. vertebralis* to be a species of relatively restricted distribution found on the high Pacific slopes of the Andes in central Ecuador and described *E. supernatis* from the Cordillera Central of Colombia and the northernmost Cordillera Real of Ecuador. Cochran and Goin (1970) confused several species with *E. vertebralis*. Except for noting the misidentifications of specimens from the Sierra Nevada de Santa Marta, Lynch (1980) deferred taxonomic comment on other purported populations of "*E. vertebralis*." Adequate material is now available to describe the frog from the Cordillera Oriental of Colombia reported by Duellman and Simmons (1977) as *E. vertebralis*.

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TAXONOMY AND MORPHOLOGY

Eleutherodactylus anolirex sp. nov. Figure 1

Holotype. KU 168626, an adult female, obtained 18.5 km (by road) S Chitagá, Departamento de Norte de Santander, Colombia, 2,850 m, on 23 August 1974 by William E. Duellman.

Paratypes. Topotypes, KU 168627–30; 32 km (by road) S Chitagá, Depto. Norte de Santander, 3,400 m, KU 168631–39; Presidente, 23 km S Chitagá, Depto. Norte de Santander, KU 150727–30; 35 km (by road) ENE Bucaramanga, road to Cucuta, Depto. Santander, 2,830 m, KU 132722–23; Páramo del Almorzadero, Depto. Santander, KU 150731–32, and 17 uncatalogued specimens in the Museo La Salle (Bogotá).

Diagnosis. 1) Skin of dorsum bearing flattened warts (least obvious anteriorly), that of venter coarsely areolate; dorsolateral folds most distinct on posterior part of body; 2) tympanum prominent, its length one-third to one-half eye length; 3) snout subacuminate in dorsal view, round in profile; eye-nostril (E-N) < eye length; canthus rostralis sharp; 4) upper eyelid width narrower than interorbital distance (IOD); low cranial crests present; 5) vomerine odontophores low, oval in outline; 6) males with vocal sac and slits, non-spinous nuptial pads on thumbs; 7) first finger shorter than second; moderate pads on fingers II–IV; 8) fingers bearing lateral fringes; 9) ulnar tubercles present; 10) small tubercle on heel; elongate tubercle on inner edge of tarsus; 11) two metatarsal tubercles, inner oval, three to four times size of subconical outer; numerous supernumerary plantar tubercles; 12) toes bearing lateral

fringes; no webs; toe pads slightly smaller than those of fingers; 13) brown above with faint cream dorsolateral stripes; lip bearing cream stripe; venter heavily flecked with brown; groin and concealed surfaces of limbs brown with small cream spots; 14) adults moderate-sized, males 24.0 to 31.8 mm, females 35.5 to 40.0 mm snout-vent length (SVL).

Eleutherodactylus anolirex is a member of the *vertebralis* assembly of Lynch and Duellman (1980), most similar to *E. briceni* (Boulenger), but differs from all other species of the assembly in that males have vocal slits and a vocal sac.

Description. Head narrower than or equal to width of body; head width (HW) 36.4 to 39.4% ($\bar{x}$ = 37.8 n = 14) SVL; snout short, E-N 71.8 to 93.8% ($\bar{x}$ = 83.8, n = 14) eye length; snout subacuminate in dorsal view, rounded in lateral profile; nostrils weakly protuberant, directed dorsolaterally; canthus rostralis sharp, feebly sinuous; loreal region nearly flat, sloping abruptly to non-flared lips; upper eyelid width 69.7 to 87.4% ($\bar{x}$ = 80.6, n = 14) IOD; no tubercles on eyelids; edges of frontoparietals weakly upturned, producing frontoparietal furrow; supratympanic fold thick, glandular, obscuring upper and posterior edges of tympanic annulus: tympanum distinct, superficial, round, length 37.8 to 47.7% ($\bar{x}$ = 42.5, n = 8) length in males, 32.4 to 45.2% ($\bar{x}$ = 36.9, n = 6) in females; tympanum separated from eye by distance equal to 1 to 1.5 tympanic diameters; two prominent round postrictal tubercles; choanae small, round, not concealed by palatal shelf of maxillary arch when roof of mouth is viewed from directly below; vomerine odontophores low, medial and posterior to choanae, separated medially by distance twice the width of a tooth clump, each bearing a clump of three to five teeth; tongue longer than wide, posterior margin notched; posterior one-third of tongue not adherent to floor of mouth; males with vocal slits, subgular vocal sac.

Skin of dorsum appears smooth anteriorly but is pitted (here interpreted as bearing low, flattened warts), whereas on lower back and upper flanks warts are more pungent; flanks areolate; low dorsolateral folds (aligned warts) most evident posteriorly; similar fold above coccyx; venter coarsely areolate; discoidal folds present; not distinct; forearm bearing ulnar tubercles, antebrachial largest; palmar tubercle bifid, much larger than oval thenar tubercle; numerous supernumerary palmar tubercles; subarticular tubercles round, moderately pungent; fingers flattened, bearing lateral fringes; fingers bearing broad discs on relatively small, rounded pads; pads of fingers III and IV larger than tympanum; first finger shorter than second (when equally adpressed, tip of I reaches base of disc of II); male with diffuse non-spinous nuptial pads on dorsal surfaces of thumbs.

Heel bearing distinct but small tubercles; an elongate tubercle on inner edge of tarsus (or a fold along distal two-fifths of tarsus); no tubercles on outer edge of tarsus; outer metatarsal tubercle subconical, one-third to one quarter size of oval (length twice width) inner metatarsal tubercle; numerous supernumerary plantar tubercles arranged in rows; subarticular tubercles round, low; toes lacking webbing (basal between IV and V) but bearing distinct lateral fringes; pads bearing broad discs, slightly smaller than those of fingers: hind legs moderately long; shank 48.4 to 56.1% ($\bar{x}$ = 52.0, n = 15) SVL; heels overlapping when legs are flexed and held at right angles to sagittal plane; heel of adpressed hind leg reaching eye.

Dorsum dark brown with pale cream dorsolateral stripes; flanks brown with numerous cream flecks; labial stripe cream; canthal-supratympanic stripe brown to black; groin, anterior and posterior surfaces of thighs, ventral surfaces of shanks dark brown with small cream flecks or spots; venter cream with dense brown flecking to brown with numerous minute cream flecks (general appearance brown).

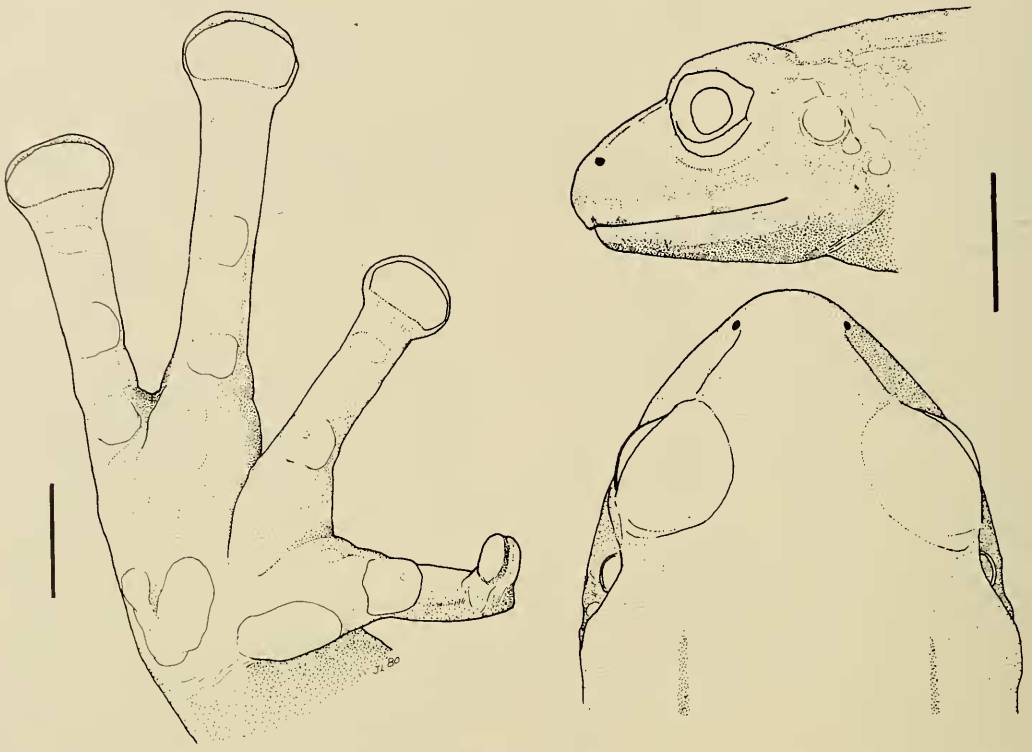

Figure 1. Hand and head of *Eleutherodactylus anolirex* sp. nov. (KU 168626, holotype). Scale for hand equals 2 mm, for head 5 mm.

Unfortunately few color notes on living specimens exist. Living specimens are described as dark brown with a distinct white stripe on the lip, venter gray-brown; iris bronze with median reddish-brown streak. The failure to mention the pale dorsolateral stripes apparent in preserved examples may mean that the stripes are not evident in living frogs.

Measurements of the holotype in mm. SVL 35.8, shank 18.4, HW 14.0, head length 11.6, upper eyelid width 3.8, IOD 4.4, tympanum length 1.4, eye length 4.2, E-N 3.7.

Etymology. The trivial name is Latin meaning King of Anoles and is used in loose reference to Ernest E. Williams. The name might also refer to the ease with which frogs of the genus *Eleutherodactylus* sit astride their lofty Andean thrones gazing down toward the Andean slopes and lowland environments with their populations of Ernest's favorite animals, the anoles.

Relationships. Eleutherodactylus anolirex is a member of the *unistrigatus* group as defined by Lynch (1976). This species group is very large (Lynch listed about 100 species) and is centered distributionally in northwestern South America, especially in the Andes of Colombia and Ecuador (Duellman, 1979; Lynch, 1979). The high species densities in Ecuador are partially real and partially a product of intense systematic research there between 1966 and 1978. Lynch and Duellman (1980) advocated the use of assemblies (a subunit of a species group) in discussing relationships and distributions within the *unistrigatus* group.

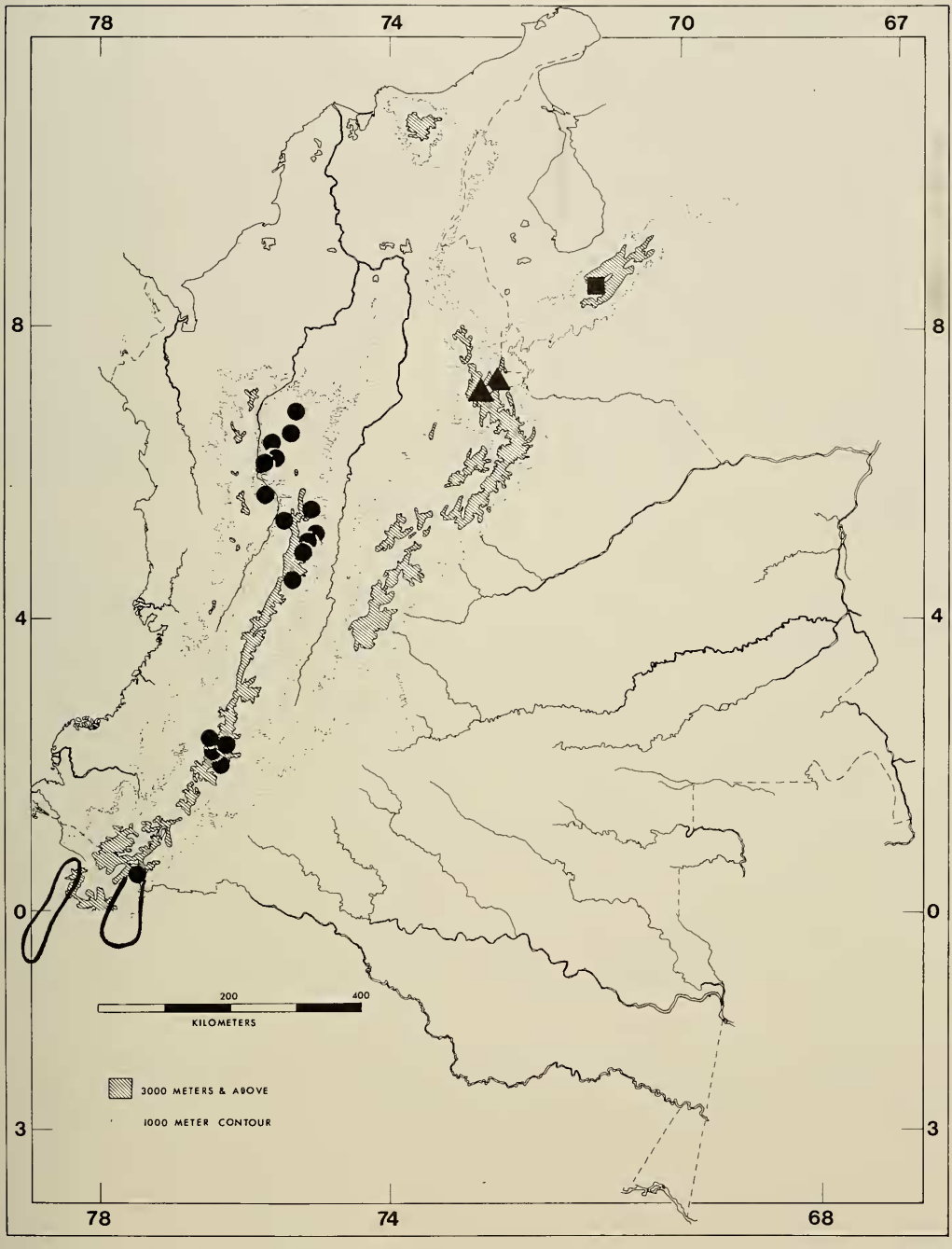

Figure 2. Distributions of members of the *Eleutherodactylus devillei* assembly. *E. anolirex* (▲), *E. briceni* (■), *E. supernatis* (●). The distributions of *E. devillei* (eastern Andean slopes, Ecuador) and *E. vertebralis* (western Andean slopes, Ecuador) are outlined (see Lynch, 1980, for dot map).

Eleutherodactylus anolirex is a member of Lynch and Duellman's *devillei* assembly. The five named species of the assembly are all moderate-sized, cloud forest-dwelling *Eleutherodactylus* with moderately developed digital pads, broad interorbital spaces, and low cranial crests. The distribution of the five species (Fig. 2) is disjunct and encompasses both modes cited by Lynch (1981) for the páramo and subpáramo assemblies found in northern Ecuador. Similar disjunct distributions seen in more vagile groups of organisms often prompt evocations of dispersal as a means to explain the biogeographic pattern. However, equally likely explanations include 1) extinctions of geographically annectant populations and 2) inadequate collecting. Whatever explanation is advocated must be consistent with the phylogenetic statement for the assembly.

My hypothesis of the relationships of the five taxa is expressed in Figure 3. The characteristics and polarities employed are as follows: A—vocal slits (present = 0, absent = 1), B—eyelid tubercle (absent = 0, present = 1), C—separation of vomerine odontophores (wide = 0, narrow = 1), D—heel tubercle (absent = 0, present = 1), E—inner tarsal tubercle or fold (absent = 0, present = 1), F—toe tips black (no = 0, yes = 1), G—dorsolateral folds (present = 0, absent = 1), H—canthus shape (sharp = 0, rounded = 1), I—occipital folds (absent = 0, present = 1), J—outer tarsal tubercles (absent = 0, present = 1). In each case, the derived state is scored as 1 and the primitive state as 0. The character-states for each species are summarized in Table 1.

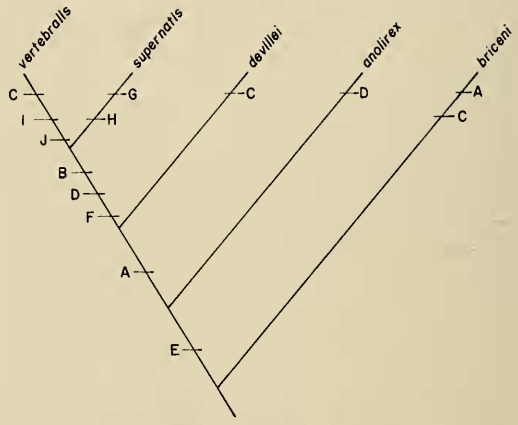

Figure 3. Cladogram of relationships in the *Eleutherodactylus devillei* assembly. Shifts from primitive to derived character-states are indicated by lettered horizontal lines (letters correspond to characters, see Table 1 and text).

The resultant cladogram (Fig. 3) appears to be geographically consistent (nearest relatives are geographically proximate for at least the three western and southernmost taxa). Unfortunately, further analysis is impeded by a dearth of knowledge about the eleutherodactyline frogs of the Cordillera Oriental of Colombia and the Venezuelan Andes. The frogs of the Ecuadorian Andes are better known, but phylogenetic statements about them are not available. The alleged impoverishment of the Cordillera Oriental is more apparent than real

Table 1. Character-states of species of the *Eleutherodactylus devillei* assembly.

Character	*briceni*	*anolirex*	*devillei*	*supernatis*	*vertebralis*
A	1	0	1	1	1
B	0	0	0	1	1
C	1	0	1	0	1
D	0	1	0	1	1
E	0	1	1	1	1
F	0	0	0	1	1
G	0	0	0	1	0
H	0	0	0	1	0
I	0	0	0	0	1
J	0	0	0	0	1

(Pedro M. Ruíz, personal communication) and for the present prevents further analysis.

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